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TO DEVELOP A LAND USE-PEAK RUNOFF  
CLASSIFICATION SYSTEM FOR HIGHWAY  
ENGINEERING PURPOSES

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Interim Report for Period January-June 1973

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
GODDARD SPACE FLIGHT CENTER  
Greenbelt, Maryland 20771

## PREFACE

(a) Objective - To devise methods of gleaning hydrological information from satellite imagery useful to highway engineers for the design of drainage structures.

(b) Scope - Visual interpretation using various methods of projection and viewing are employed. Electronic and photographic enhancement will be accomplished with at least three available cloud-free scenes.

(c) Conclusion - A limited amount of cloud-free black and white satellite imagery has been received to date plus the delays in receiving colored composites hampered the progress of the project.

(d) Recommendations - On time deliver of color composite which would expedite the study.

Introduction - Sides of I<sup>2</sup>S and Spectral Data were analyzed. Ground truth data at several hundred sites was obtained. Vinten and RC10 photography were tested for use with the tentative land use classification system.

Text

1. Analyzed slides of I<sup>2</sup>S and Spectral Data MSS data taken at Goddard and the University of Vermont.

2. Obtained considerable ground truth data at several hundred sites relative to forest types, agriculture, wet lands and other rural natural and cultural features associated with a tentative land use classification system tailored for providing runoff data used by Maine Department of Transportation design engineers.

3. Vinten and RC 10 photography taken on 20 September 1972 were tested for use with the tentative land use classification system included in the original proposal. The study indicated that this photography was very adequate for this purpose.

4. Because of inclement weather only three short recon flights in small aircraft were made during this period to obtain 35 mm color and color infrared vertical photos taken at scales of 1:25,000 and 1:50,000.

5. The information described in Item 1 to 4 inclusive will be used as ground truth for further analysis of ERTS data as described in the paragraphs to follow.

Program for next reporting interval

1. Arrangements have been made to spend four days at the General Electric Multispectral Information Extracting System (GEMS) at Valley Forge, Pa., in the latter part of June. Two ERTS scenes will be analyzed. It is hoped that reliable spectral signatures can be determined for at least five, and possibly ten, land use mapping units. These signatures will be used to classify similar features in several select study areas

where considerable ground truth is available.

It is intended to produce a series of overlays which will be combined for the ultimate production of several types of land use maps. The land use manuscripts will be field checked to determine the statistical accuracy of the thematic maps developed at the GEMS facility. Should the end product prove to be adequate for the intended use of the highway hydraulic design engineers, the procedures will be applied to additional areas in blocks of about 3500 square miles for the production of land use maps at a scale of 1:125,000 or 1:250,000. Results of this phase of the study will probably be reported during the month of August. If time permits, several RC-10 and Vinten CIR frames will be analyzed.

Conclusions - The coverage taken during the coloration season, particularly the yellow pattern of the swamp hardwoods (Red Maple, Ash, and Elm) was very easy to delineate because of the high contrast with the magenta pattern of the adjacent upland hardwoods. The perimeters of swamp hardwood sites, which are effective water storage areas, are very difficult to delineate accurately in an undulating or gently rolling terrain where the surrounding environs are covered by upland hardwood forest.

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16. Abstract <p>Ground truth data at several hundred sites relative to forest types, agriculture, wet lands, and other rural natural and cultural features associated with tentative land use classification system were obtained. Three reconnaissance flights in small aircraft made during this period to obtain 35 mm color and color infrared vertical photos taken at scales of 1 : 25,000 and 1:50,000. These data will be used for semi-automatic analysis using the General Electric GEMS facility in the latter part of June.</p>			
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